

Tree Growth Field Trial at Monocacy Natural Resources Management Area  
4<sup>th</sup> Season, 2007

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A seedling growth field trial was initiated at Monocacy NRMA in 2004 to monitor the development and survival of seedlings under four different growing conditions namely, growing without any type of protection, growing in tree shelters at a 10' x 10', growing in tree shelters at a 20' x 20' spacing, and growing inside deer fencing. The purpose of this study is to examine and record such parameters as seedling growth and development, survival, cost of establishment and expenses associated with subsequent maintenance practices. This information is recorded; and, the final growth and survival measurements are collected each year in late October, at the end of the growing season. In October, 2007 we conducted the fourth and final measurements for this study. The following article summarizes our observations.

**Maintenance Practices:** We mowed the site three times in 2007 during June, August and late September. The purpose of the mowings were to help ensure that Canada thistle was not permitted to go to seed and to maintain the clover cover crop. Besides the mowings, some spot control of thistle was conducted in June and July with a back pack sprayer using the herbicide *Stinger*, and Ailanthus control was conducted in July using the herbicide *Touchdown*. During 2007 we also had to replace some of the metal support stakes for the deer fencing because they had bent in strong winds, corroded, or fractured under stress. In addition, we had to replace some of the monofilament line that supports the top of the fence. Most of the original metal stakes display a lot of rust and it looks like they will need to be replaced. The total cost of mowing and weed control for 2007 was \$920 or \$90/compartiment. The total cost for the deer fence repair was \$180.00.

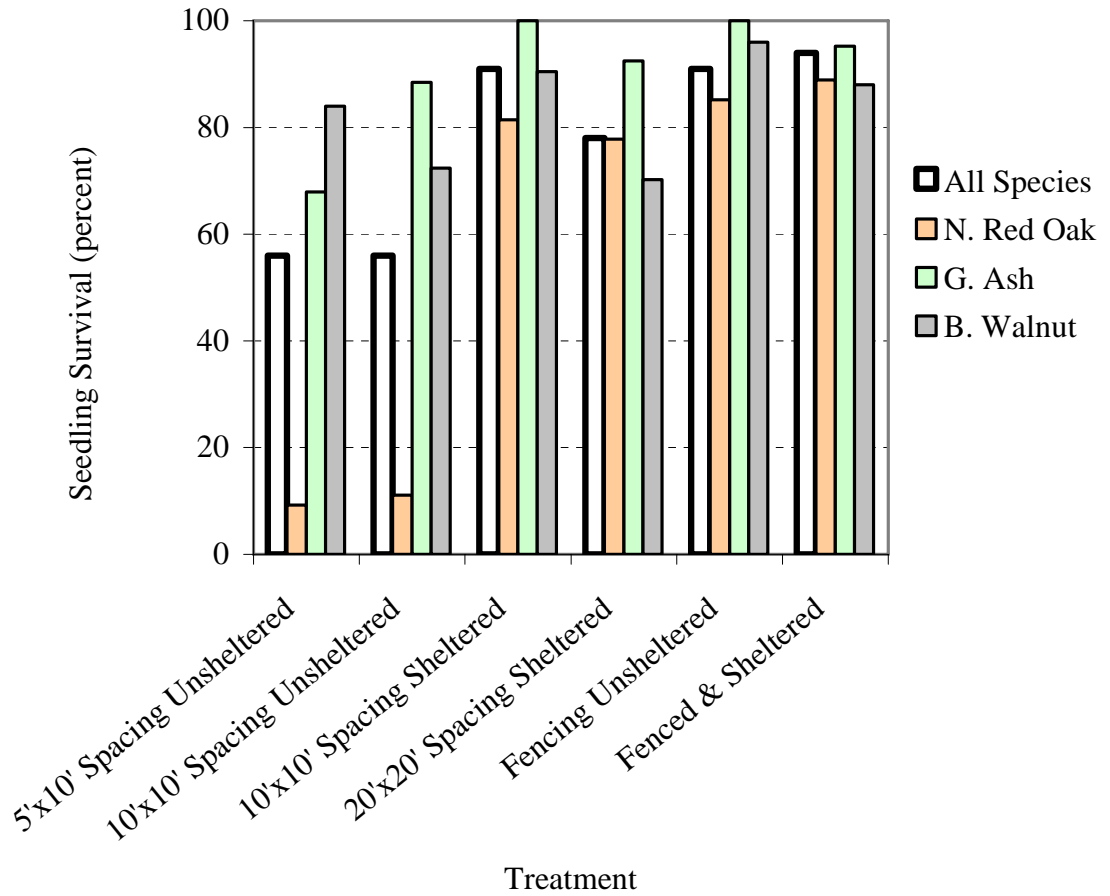
**Growth and Survival Measurements:** Our annual growth measurements were gathered in October. This is the final year we will collect this data. The average diameter and height growth and survival percent recorded for each compartment is illustrated in the following tables:

**2007 Results: Diameter, Height, and Survival recorded on October 23, 2007**

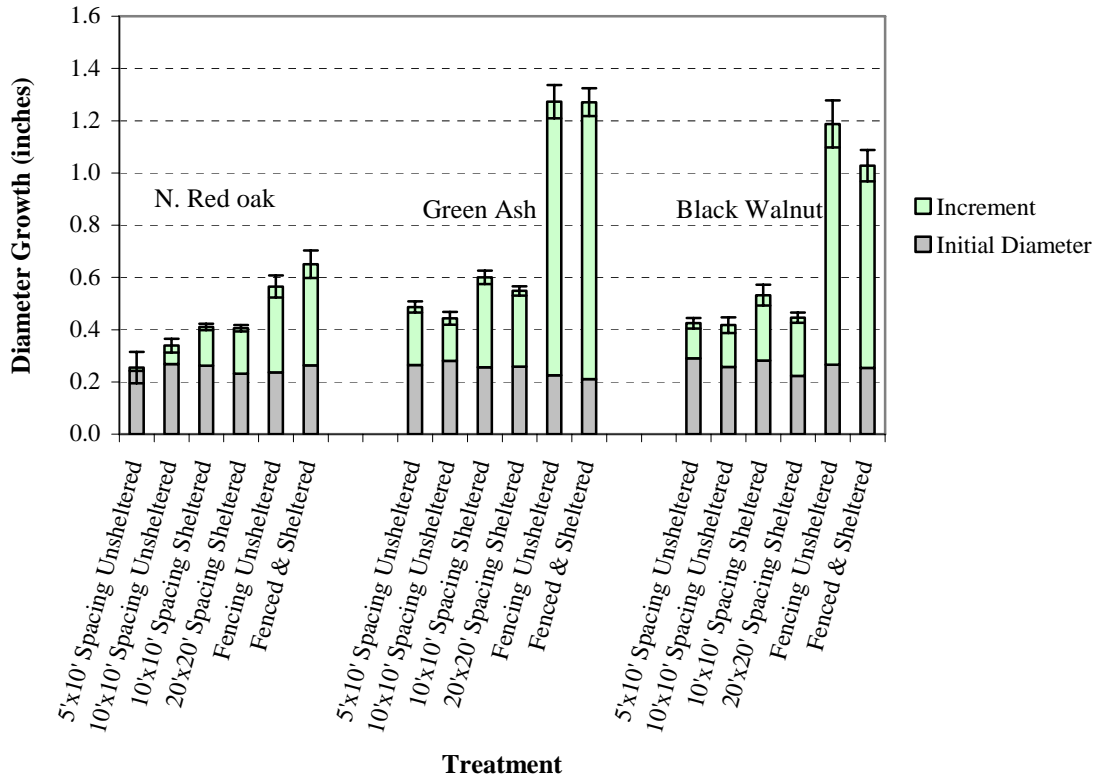
	Red Oak	Green Ash	Black Walnut
<b>Deer Fence</b>	.66" dia. 65" height 85% surv.	1.45" dia. 88" height 95% surv.	1.08" dia. 69" height 88% surv.
<b>10' x 10' 50% covered</b>	.34" dia. 48" height 46% surv.	.52 dia. 50" height 94% surv.	.52 dia. 50" height 81% surv.
<b>No Protection</b>	.30" dia. 10" height 9% surv.	.48" dia. 24" height 68% surv.	.42" dia. 19" height 84% surv.
<b>20' x 20' 100% covered</b>	.43" dia. 48" height 78% surv.	.56" dia. 53" height 92% surv.	.45" dia. 53" height 70% survival

**Results: Seedling Survival, Height, and Diameter Increment**

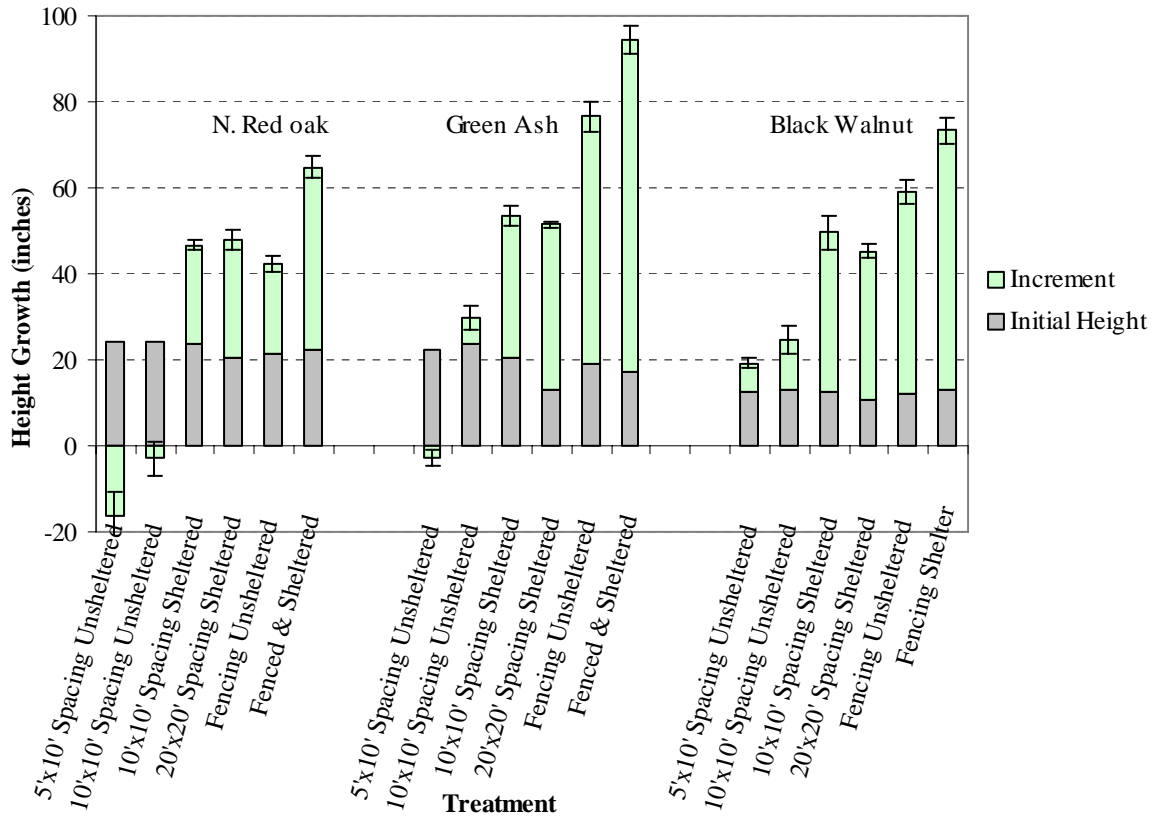
***Seedling Survival***



## Diameter Increment



## Height Increment



**Growth Measurement Observations:** All of the species in the deer fenced area continue to increase in height and diameter growth and the survival remains in a desirable range; the red oak demonstrated the largest growth increase in both height and diameter. This seems consistent with previous observations that oak development tends to lag behind for a few years then they put on a growth spurt. Increases in diameter and height growth were also observed in the 20' x 20' and 10' x 10' compartments where tree shelters were employed. However, the height growth seems to be stagnating near the top of the 48" tall shelter. It is obvious that deer are nipping these trees back to the lip of the enclosure. This is especially true with the red oak and green ash and not so much with the walnut which is probably distasteful to the deer. Overall survival is adequate in all of the sheltered sites except for the 46% survival noted for red oak in the 10' x 10' compartment. The increased mortality was observed mostly in the unsheltered oaks. Trees in the 5' x 10' compartment that are growing with no protection are being browsed back to a 10" – 20" height, which in many cases constitutes a reduction in height growth compared to the 2005 and 2006 readings. The increased deer feeding pressure may be due to the drought conditions resulting in an overall reduction of herbaceous plant growth available for the deer to browse. Survival for unsheltered red oak in this compartment was further reduced to a 9% survival rate; and, there are very few oaks left in this

compartment. Survival for unsheltered green ash is nearing an undesirable level at 68% and black walnut remains at an acceptable level at 84%.

### **Establishment and Maintenance Costs**

The following costs have been computed over the last four growing seasons:

		Initial Costs	Initial Costs + 4 Years Maintenance
A	Deer Fence	\$2,183.28	\$2,914.28
B	10' x 10'	\$1,226.00	\$1,587.00
C	5' x 10'	\$505.00	\$776.00
D	20' x 20'	\$1,139.00	\$1,500.00

**Other observations:** It appears that deer continue to have the greatest impact on seedling growth, development and survival in this planting. Deer feeding pressure is causing the height growth of sheltered trees to stagnate around 48 inches tall and 20 inches for the unsheltered individuals. The trees inside the deer fence have the greatest overall growth and survival, and they have the most natural appearance maintaining their terminal buds and normal growth characteristics. The metal poles used to support the deer fence are nearing the end of their lifespan and the deer fencing is getting ready to implode. We have decided to rotate the deer fencing to the other compartments once the study is over to enable these trees to grow in the absence of deer feeding pressure. The 2007 growing season was very dry, with a pronounced drought during the months of June, July, and August. As such, lack of rainfall may have influenced plant growth and/or severity of deer feeding pressure. Canada thistle continues to be the most problematic weed we have encountered and it does not appear that broad-spectrum sprays have reduced their numbers. Our weed control strategy is now to prevent the thistle from going to flower by mowing and spot herbicide treatment with a back pack sprayer. The frequent mowings are also enabling the clover to flourish as a cover crop especially during the winter months. This moderate ground cover does not create desirable mice or vole habitat; and, as such, we have not experienced much rodent related damage.

We have finished our data collection at the field trial. Nonetheless, we will continue to maintain the area for the purpose of providing a demonstration site and for the ultimate goal of reforesting the area. We intend to rotate the deer fencing to the other compartments to provide an opportunity for the trees to outgrow deer feeding pressure. Most of the deer fencing can be reused although we intend to use pressure treated timbers instead of the metal posts in the hope that yearly deer fencing maintenance costs are reduced or eliminated. Finally, we intend to draft a comprehensive report to illustrate our observations and findings.